PUBLIC SAFETY
NOISE
AND
SCENIC HIGHWAYS
ELEMENTS

OF THE

MODOC COUNTY

GENERAL PLAN

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FOR
SAFETY AND SEISMIC SAFETY ELEMENTS

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INTRODUCTION TO
PUBLIC SAFETY ELEMENTS

Government Code Section 65302 requires a Safety Element and Seismic Safety Element to be prepared for each County and City General Plan. Since Seismic Safety is so closely related to the other segments of public safety, these two elements are most logically prepared in a single document.

The Public Safety Element is broken down into two sections:

1. Policy relating to public safety in Modoc County.
2. Appendix material describing major hazards and a discussion of the potential effect in Modoc County.

The various hazards discussed in the appendix are: Flooding, Fire, Earthquake Shaking, Faulting and Volcanic Action.

POLICY REGARDING PUBLIC SAFETY IN MODOC COUNTY

<u>It shall be the policy of Modoc County to not adopt any new restrictions or regulations relating to Safety or Seismic Safety at this time.</u>

Existing policies and procedures are adequate to protect the public health, safety and welfare from any presently recognized, potentially damaging safety or seismic safety hazards.

FIRE HAZARD

The California Division of Forestry made the following analysis of the statewide wildland fire problem in its report to the Governor's Office of Planning and Research, April, 1973:

"California has a wildland fire potential that is found nowhere else on earth. The combination of highly flammable vegetation, long and dry summers, rugged topography, and people who work or recreate in the wildlands adds up to a situation which results in several thousand wildfires each year. Dependent upon local burning conditions, these fires can and do occur in any month of the year throughout the state.

"Most wildfires are controlled within the first few hours by a fire protection system that includes the California Division of Forestry and many other federal, state, and local government fire protection agencies. On a few occasions fires escape initial control efforts and become large and especially destructive. These few fires - which cause most of the annual loss to natural resources, life, and property - most frequently occur within a small number of critical days each year when air temperatures commonly rise to over 100°F, relative humidity drops to near zero and hot dry north or east winds blow at high velocities. Fires burning under these conditions have two characteristics in common: rapid spread and high intensity (i.e., high rate of heat energy output). Generally they spread with only minor regard to topography and narrow breaks in the vegetation. They may project flaming embers several miles ahead of the main fire front and engulf individual residences or large numbers of homes in wildland subdivisions or around the perimeters of urban communities.

"In 1970, in the short period of September 22 through October 4, a total of 773 wildfires burned over 580,000 acres of land throughout the state. These fires totally destroyed 722 homes and took 16 lives. In California similar disasters have occurred many times in the past.

"The potential for further heavy losses in life and property continues to exist throughout the state's 61 million acres of wildland. The potential increases as residential and recreational developments encroach further into the wildlands. Many steps can be taken to reduce this potential loss to life and property by wildfire: enforcement of proper building codes designed to make homes built in the wildlands relatively safe; implementation of fire safe practices, including proper road construction and adequate water systems; and, perhaps most important, proper land use planning and zoning which will designate where and under what conditions people should live in the wildlands relative to their exposure to the hazard of wildfire. Local government planners need basic information so that such land use policies and zoning criteria can be developed to help reduce the possibilities of wildfire disaster.

"Any wildfire, regardless of size or location, poses a threat to life and property until it is contained or controlled. Therefore, it must be recognized that all wildlan areas in California are 'hazardous' and that fire prevention and safety measures must be used wherever people and their improvements interface with the wildlands. However, it must also be recognized that there are varying degrees of hazard and therefore varying degrees of fire prevention and safety measures that must be practiced by wildland residents and users."

POTENTIAL EFFECT IN MODOC COUNTY

Table S-1 shows the year, size and cause of the larger fires that have occurred on the Modoc National Forest in Modoc County over the past 25 years. Figure S-1 shows the approximate location of these fires. These fires occurred in sparsely populated portio of the county and there was no loss of life and little structural damage.

Modoc County requires all major subdivision proposals to be submitted to the responsible fire control agencies for review and comment. Environmental assessments, considering fire and other hazards, are made for all land divisions and other projects for which the County has approval authority.

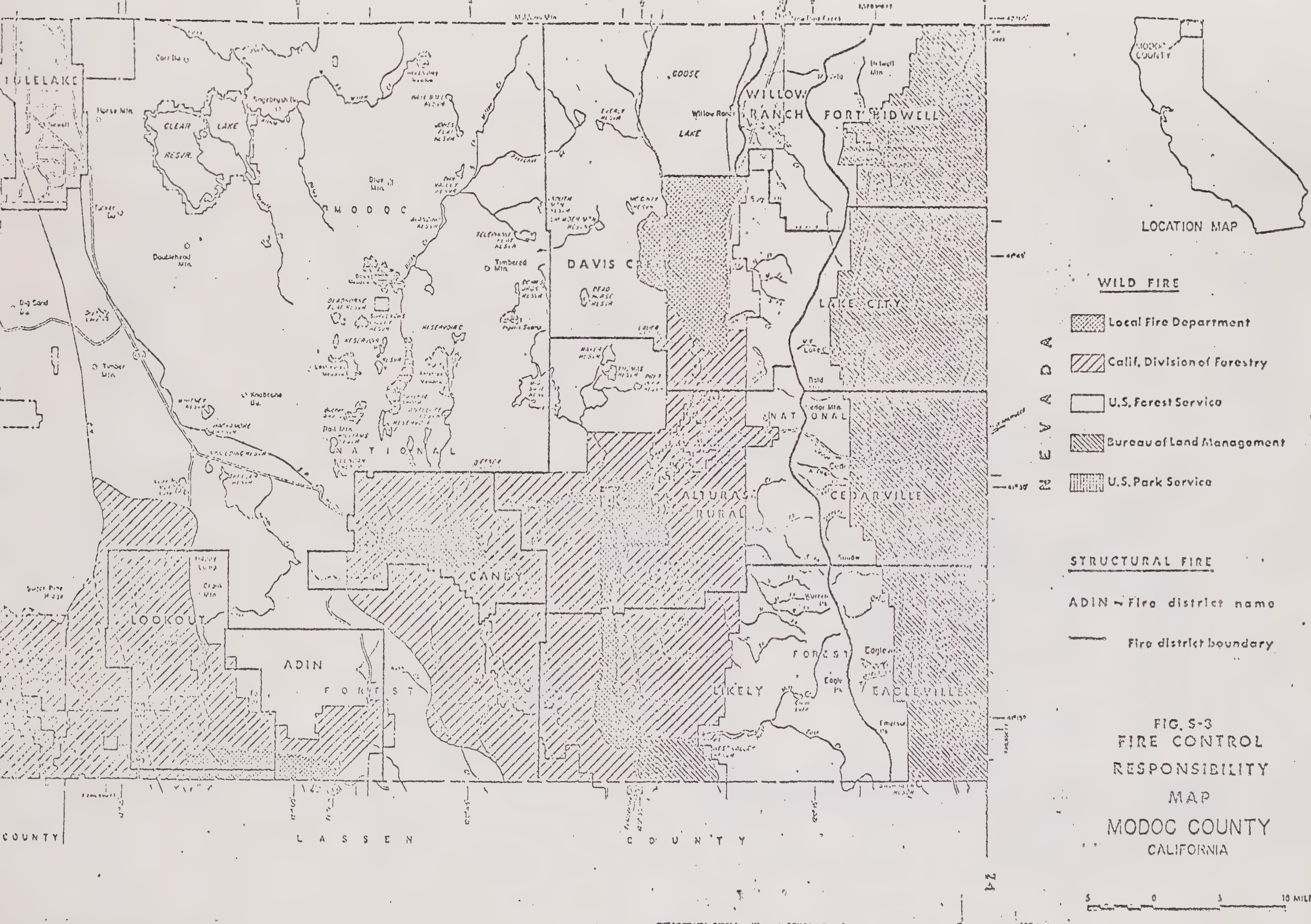

FIG. S-3
FIRE CONTROL
RESPONSIBILITY
MAP
MODOC COUNTY
CALIFORNIA

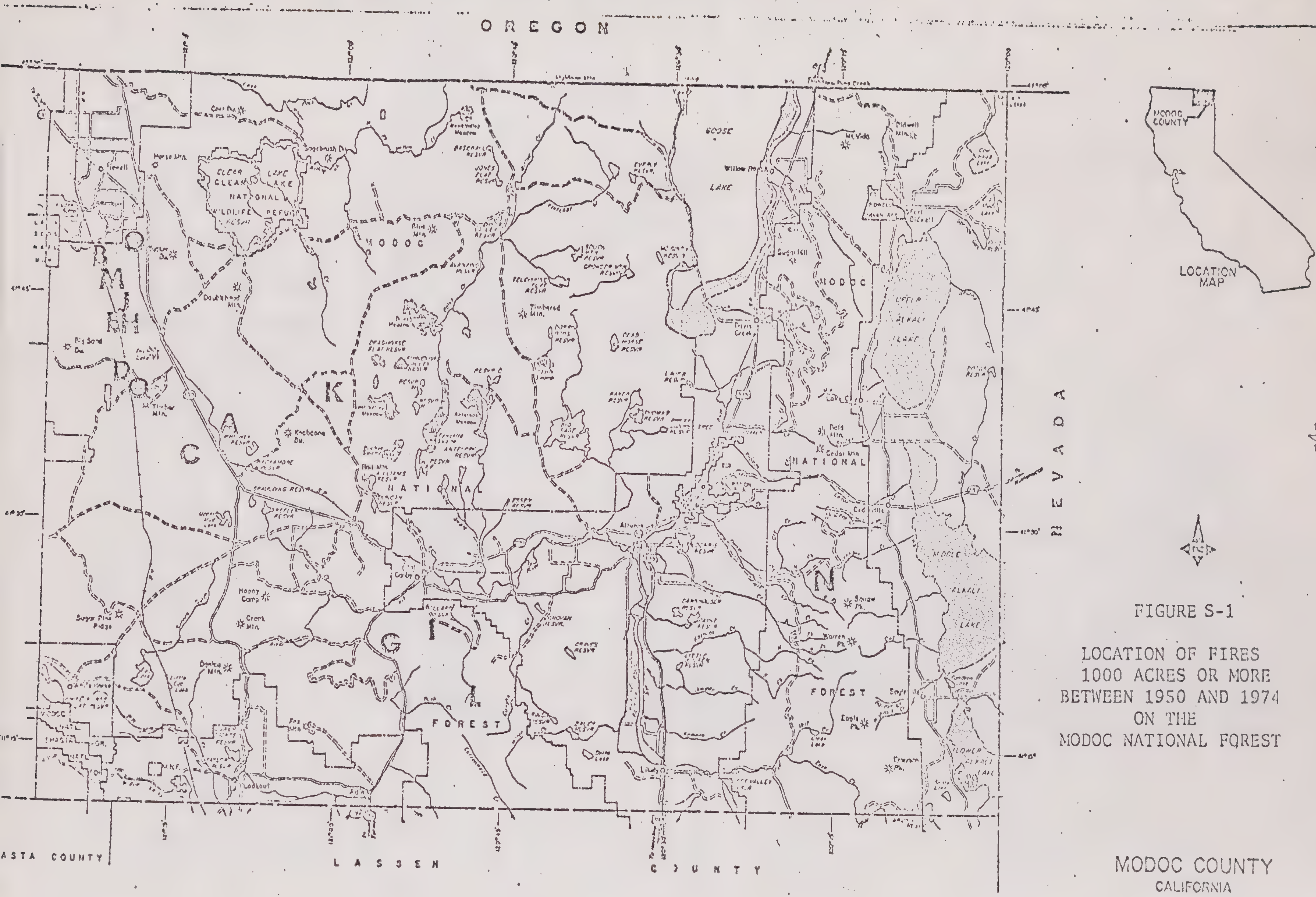

FIGURE S-1

LOCATION OF FIRES
1000 ACRES OR MORE
BETWEEN 1950 AND 1974
ON THE
MODOC NATIONAL FOREST

MODOC COUNTY
CALIFORNIA

MAY 1974

TABLE S-1

MAJOR FIRES ON MODOC NATIONAL FOREST
IN MODOC COUNTY DURING RECENT YEARS:

FIRE NAME	YEAR	CAUSE	ACRES BURNED	MAP SYMBOL
Mears	1951	Railroad	25,000	A
M.P. 40	1957	Railroad	11,405	B
Plum Ridge	1950	Lightning	10,500	C
Pumice Hill	1950	Man	6,680	D
Mammoth	1950	Railroad	6,580	E
Adin Pass	1960	Man	4,420	G
Twin Sister	1954	Railroad	3,800	H
Baggett Gulch	1950	Man	3,795	I
Twin	1971	Railroad	3,305	J
Mowitz	1951	Man	1,858	K
Jackson Cabin	1951	Man	1,479	L
Casuse	1971	Railroad	1,469	M
Parker Creek	1958	Lightning	1,190	N
Casuse Ridge	1954	Man	1,097	O

FLOODING

While flooding is not generally considered to be a geologic hazard, Bulletin No. 198 contains the following discussion of flooding in California:

"Flooding is one of the costliest natural hazards in California. National statistics show that California ranks as one of the major flood problem areas in the nation and that flooding is one of the principal factors to be considered in the overall development and use of land resources. Although existing flood control measures have, in general, been effective in controlling or reducing flood damages, flood problems have nonetheless continued to grow. The distribution of areas subject to flooding in California is shown in figure S-4.

"Flooding events are of two main types:

1. Off-site flooding, caused by rain or snow-melt water from upstream watersheds.
2. On-site flooding caused by the runoff of water in local areas.

"Off-site flooding may involve large volumes of water and is a frequent cause of flood damage in California. Federal, State and regional agencies have developed large and sophisticated programs to cope with this type of flooding on a long-term basis. On-site flooding is basically the responsibility of county and city governments, commonly acting through local flood control districts.

"The numerous programs for reducing flood losses include both structural and nonstructural approaches, some directed at preventing floods, others at controlling those that cannot be prevented. Structural measures include flood-water storage systems such as dams, reservoirs, basins and the construction of related facilities such as levees and channel developments. Watershed land treatment may also be carried out to reduce runoff, debris movement, erosion, and sedimentation. Nonstructural measures include flood forecasting, zoning and subdivision regulations, the exclusion of use in primary floodways, building code requirements and the evacuation of flood

areas. For many agricultural and developed urban centers, structural measures are most feasible; for emerging communities, however, nonstructural measures appear to be more effective.

"There are other specific nonstructural needs which would further reduce flooding losses. Improvements in weather science could allow quantitative, short-term precipitation forecasts in a particular watershed. The art of flood forecasting, based mainly on hydrology, is ahead of weather forecasting in the sense that flood crest times can be accurately predicted if precipitation distributions are known.

"There is a need for effective zoning procedures under which controls could be exercised over the uses permitted in designated floodways. Zoning is primarily a political problem, and the authority to establish and enforce zoning laws effectively lies with local government. Potential flood boundaries can be established, through techniques of hydrology, but authorities in local government must exercise control in the land use planning of hazardous areas. Local government should prohibit, by ordinance and/or zoning, urban or commercial development in a flood-prone zone unless flood control facilities are provided.

"Flooding has long been recognized as a serious problem in California and many laws relating to flooding are now in effect within the state. The Subdivision Map Act specifies that the Division of Real Estate may refuse approval of a subdivision if it is threatened by flooding (Sec. 11551.1, Business and Professions Code). Prospective school sites must have suitable engineering work done to assure that surface drainage conditions have been considered (Sec. 15002.1, Education Code). Flooding must be considered in several elements of the general plan."

POTENTIAL EFFECT IN MODOC COUNTY

The largest areas of potential flood hazard in Modoc County are in Big Valley and along the South Fork of the Pit River between Likely and Alturas. Other susceptible streams include several of those in Surprise Valley, the North Fork of Pit

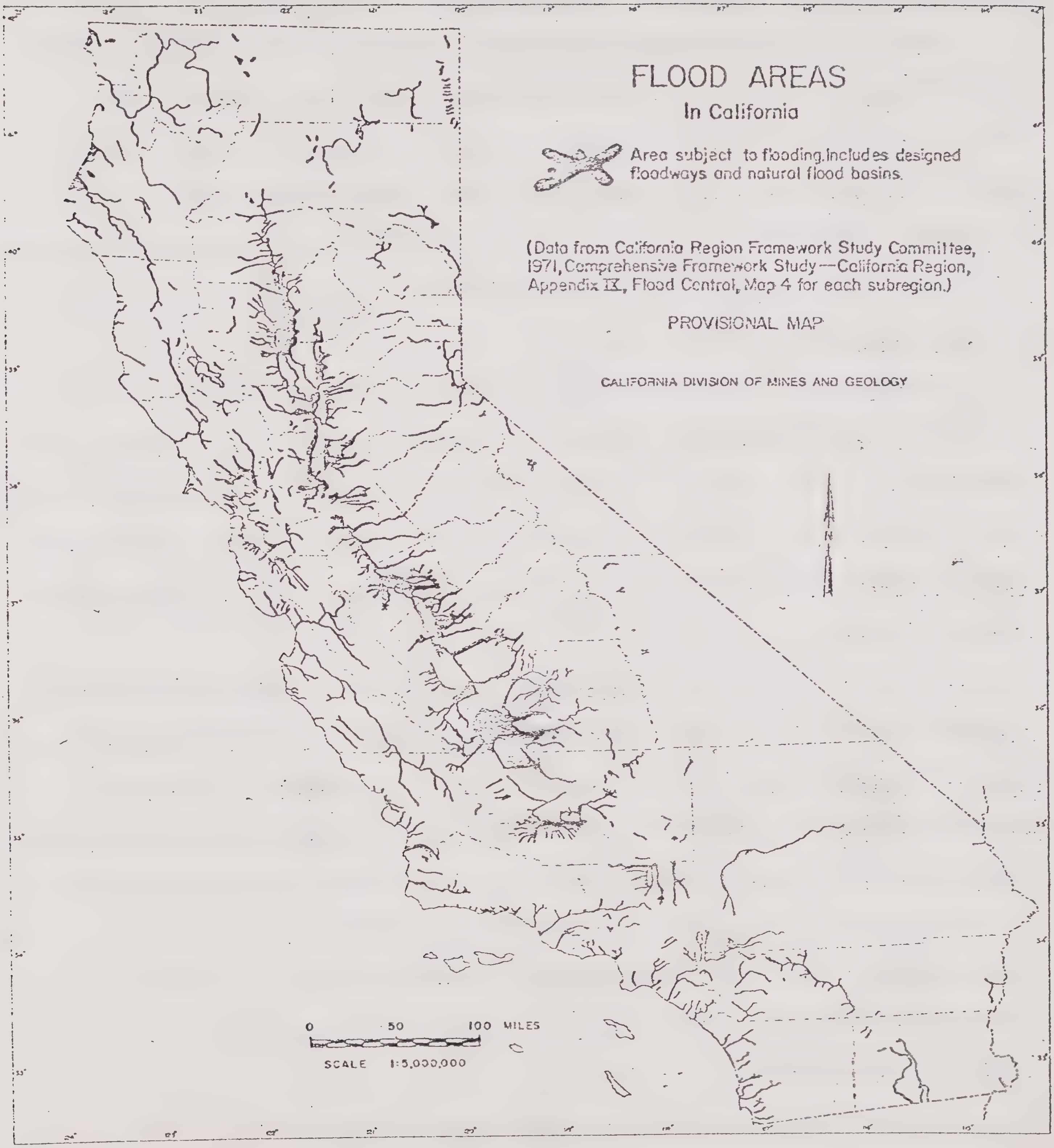

Figure 6. Flood areas in California.

Figure S-4

River and the Pit River between Alturas and Canby.

Most flooding takes place on agricultural lands but Alturas and Adin have had considerable residential and commercial property damage in the past. A U.S. Army Corps of Engineers channel improvement project was completed in 1972 to protect the city of Alturas from 100 year frequency floods. Flood plain zoning was passed to complement this project. The Army has constructed a channel improvement project in the town of Adin this year to provide protection for approximately seven year frequency floods.

Several streams in Surprise Valley have been channelized by the Corps to protect agricultural lands from flood damage. The heavy bed loads and high velocity flows have made it impractical to maintain most of these channels in a functional condition. Some channels have filled with rock and gravel while the dikes have washed away on others. Where maintenance has been carried out, a high level of flood protection appears to exist.

With the construction of flood channels to protect the homes and businesses in Alturas and Adin, flood prone agricultural areas remain as the major potential recipients of flood damage. Several studies have been conducted in an attempt to develo projects for flood protection for agricultural lands. These studies have indicated that the cost of providing protection exceeds the value of the damage in most cases.

Local Resource Conservation Districts have developed studies of several streams to determine if water development and flood control projects are feasible. The more promising of these projects are: Stones Canyon, Pine Creek, Lassen Creek, Parker Creek and Thoms Creek.

The Allen Camp Reservoir, still under study by the Bureau of Reclamation, would provide flood control, irrigation and recreation benefits.

Modoc County has entered into the federal flood insurance program and will be obligated to meet the flood plain management requirements of that program. Environmen

assessments, considering flood and other hazards, are made for all land division and other projects for which the County has approval authority.

EARTHQUAKE SHAKING

Earthquakes have the potential of causing more damage in California and in Modoc County than any of the other geologic hazards. The following discussion of earthquake shaking was extracted from the California Division of Mines and Geology Bulletin No. 198. It gives an insight to the potential for damage and suggests preventive measures that might be taken to reduce the hazard to life and property that might result from a major earthquake.

"The largest losses of life and property in California due to geologic hazards have been caused by violent ground shaking during earthquakes. Earthquake shaking is largely due to the release of seismic energy during periods of sudden displacement along a fault. Since 1812 a total of 26 damaging earthquakes have struck California, inflicting a total life loss of 1,020 and dollar property losses in excess of $1 billion in dollar values at the time of the earthquakes or more than $7 billion in 1971 dollar value.

"The greatest threat to life and property is posed by those structures that do not conform to the current Uniform Building Code relative to earthquake loading. Applying loss-reduction measures to these structures is a major challenge because of the political, social and economic problems involved. Great benefit would be achieved in preventing life loss, but the benefit: cost ratio to prevent property damage, would be relatively low. Partial reduction of the structural hazards such as strengthening or removing parapets and cornices and reducing occupancy exposure by a lesser intensity of use will have higher benefit: cost ratios.

"At present it is impossible to prevent, control or accurately predict earthquakes. Therefore, since severe earthquakes will continue to occur in California, our structures must be made capable of withstanding shaking forces without serious failure and resultant injuries and loss of life. A severe earthquake does not have to be a disaster if our structures and cities are designed and built properly and if we are prepared to

respond effectively to the event. The generalized distribution of maximum expectable earthquake intensity in California is shown in figure SS-1.

"The map is based on the known distribution of damaging earthquakes and the Modified Mercalli intensities associated with these earthquakes; on evidence of strain release; and on considerations of major geologic structures and provinces believed to be associated with earthquake activity. The Uniform Building Code, 1970 edition, in Section 2314 describes strength and lateral force requirements for buildings in those various zones."

Figure SS-1 shows that on the basis of historical records an earthquake in the vicinity of Modoc County is likely to have an intensity of VII to X on the Modified Mercalli Scale.

Table SS-I, from Bulletin 198, shows the effects that would be observed for various intensities of earthquake. Note that for an intensity of VIII, all masonry buildings will suffer damage. Well constructed buildings designed to resist the lateral forces of an earthquake would suffer less damage. Some frame structures will be damaged at an intensity of VIII. When the intensity reaches X, most masonry and frame structures will be destroyed, regardless of how well they are designed and constructed.

C.S.U. Regional Programs Monograph #1 "Earthquake Hazard in Northeast California" by Guyton and Scheel, presents the problem in a somewhat different light:

"Although earthquake prediction is currently the subject of much research, it is not yet possible to predict future seismic activity with reliability. We can only extrapolate from past experience and hope that nature does not have too many surprises for us.

"Earthquakes are caused by natural processes within the earth that proceed at very slow rates compared to human perception; timespans of many thousands or several

millions of years are typical. Recognizing this we are justified in inferring that the next thousand years will be like the last thousand years. The problem is that we rarely know what the last thousand years has been like in sufficient detail. The earthquake record in northeast California extends only slightly more than one century into the past, and only the most recent 50 years of this span are completely satisfactory.

"In brief, we would probably be correct in anticipating the next thousand years if reliable records extended for a thousand years into the past. To anticipate the next 100 years from the last 100 years is less justifiable owing to the brevity of experience in comparison with the tempo of the natural process.

"At this junction there are three alternative ways to proceed:

1. Assume the best: The best possibility is that our brief earthquake history is an adequate sample, and that for the foreseeable future, the events of the known past will not be exceeded. We note that an extensive study of possible earthquake effects in the San Francisco Bay region (Nat'l. Oceanic and Atm. Adm., 1972) assumed as their largest, most disastrous model earthquake, one equal to the 1906 earthquake. There is justification for this reasoning, but it is risky. There is absolutely no reason to believe that the future will be <u>less</u> active than the past. For it to be exactly equal to the past would seem too fortuitous to be readily accepted. Thus it is prudent to anticipate that the future will hold something greater than recorded history reveals.
2. Assume the worst: A touchstone of seismologic thought is that if you wait long enough any given location will be subject to shaking of great intensity. The New Madrid, Missouri earthquakes of 1811 and 1912, and the Charleston, South Carolina earthquake of 1886 remind us that you do not have to be in a notorious seismic area to be subject to extremely severe

earthquake shaking. Indeed, one of the great problems of regional seismic risk maps has to do with these two earthquakes forcing inclusion of these two areas in a high-risk category. This being so, should not all geologically similar regions of the U.S. be so classified? The person who would make a seismic-risk map for the U.S. thus faces a cruel dilemma... he must either ignore major events, or include virtually all of the U.S. as high risk, an action that minimizes the utility of his map. This approach is safe, for if with the passage of time, that which is anticipated does not occur it is simply because not enough time has passed. Thus the day of judgment is postponed into the future to a time when being proven wrong would no longer be an embarrassment.

City and County planners need not take the distant future into account, and perhaps should not try. Castles of Europe and England remind us that while it is possible to build to last for hundreds of years, it is not necessarily wise to do so.

Thus we reject this approach as begging the question, which should be "What is to be expected in the near future?" rather than, "What is possible in the indefinite future?"

3. Compromise: One might be at ease assuming that the near future will bring what the known past has delivered plus a little more. From the known distribution of intensities we note that while VI has been relatively common, VII has been sparse, and VIII has been very rare, if it has been reached at all. Thus we might be justified as predicting VIII as the highest intensity that should be planned for. The other obvious choice would be to plan for IX, but, as we review damage reports we feel (albeit intuitively) that reported intensities have been overestimated often and not underestimated at all; hence the VI and VII reports suggest,

to us, that an "honest" VIII is more likely than an "honest" IX is." Figure SS-2, from the C.S.U. Monograph, shows the location of all earthquakes reported in northeast California.

POTENTIAL EFFECT IN MODOC COUNTY

The Division of Mines and Geology indicates that the Surprise Valley and the Goose Lake areas can expect earthquake intensities of IX or X, while the rest of Modoc County can expect intensities of VII or VIII. The latest Seismic Risk map from the Uniform Building Code shows that we can expect intensities of VIII or greater throughout the county. Chico State University recommends that the counties of northeast California plan for a maximum intensity of VIII. Past history tells us that VI is the maximum intensity observed by white man in Modoc County.

Modoc County has adopted and is enforcing the Uniform Building Code which places Modoc in the most severe earthquake hazard zone.

Because of Modoc County's sparse population and relatively low potential for extensive development, the possibility of major property damage or loss of life resulting from earthquake shaking is extremely remote.

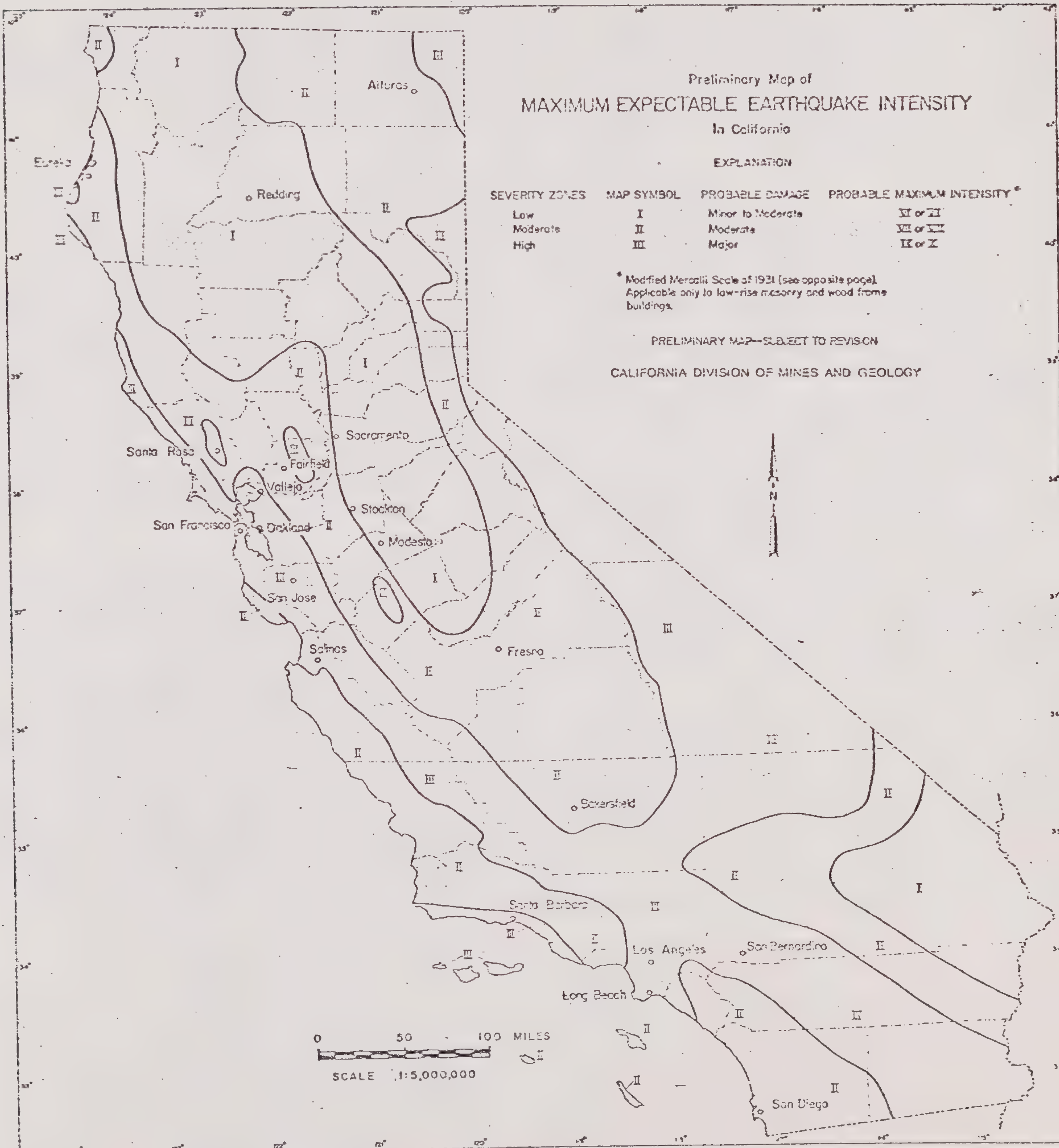

Figure 3. Preliminary map of maximum expectable earthquake intensity in California.

Figure SS-1

Table 3. Modified Mercalli scale of earthquake intensities.

THE MERCALLI INTENSITY SCALE
(As modified by Charles F. Richter in 1956 and rearranged)

If most of these effects are observed	*then the intensity is:*
Earthquake shaking not felt. But people may observe marginal effects of large distance earthquakes without identifying these effects as earthquake-caused. Among them: trees, structures, liquids, bodies of water sway slowly, or doors swing slowly.	*I*
Effect on people: Shaking felt by those at rest, especially if they are indoors, and by those on upper floors.	*II*
Effect on people: Felt by most people indoors. Some can estimate duration of shaking. But many may not recognize shaking of building as caused by an earthquake; the shaking is like that caused by the passing of light trucks.	*III*
Other effects: Hanging objects swing. *Structural effects:* Windows or doors rattle. Wooden walls and frames creak.	*IV*
Effect on people: Felt by everyone indoors. Many estimate duration of shaking. But they still may not recognize it as caused by an earthquake. The shaking is like that caused by the passing of heavy trucks, though sometimes, instead, people may feel the sensation of a jolt, as if a heavy ball had struck the walls. *Other effects:* Hanging objects swing. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. *Structural effects:* Doors close, open or swing. Windows rattle.	*V*
Effect on people: Felt by everyone indoors and by most people outdoors. Many now estimate not only the duration of shaking but also its direction and have no doubt as to its cause. Sleepers wakened. *Other effects:* Hanging objects swing. Shutters or pictures move. Pendulum clocks stop, start or change rate. Standing autos rock. Crockery clashes, dishes rattle or glasses clink. Liquids disturbed, some spilled. Small unstable objects displaced or upset. *Structural effects:* Weak plaster and Masonry D* crack. Windows break. Doors close, open or swing.	*VI*
Effect on people: Felt by everyone. Many are frightened and run outdoors. People walk unsteadily. *Other effects:* Small church or school bells ring. Pictures thrown off walls, knicknacks and books off shelves. Dishes or glasses broken. Furniture moved or overturned. Trees, bushes shaken visibly, or heard to rustle. *Structural effects:* Masonry D* damaged; some cracks in Masonry C*. Weak chimneys break at roof line. Plaster, loose bricks, stones, tiles, cornices, unbraced parapets and architectural ornaments fall. Concrete irrigation ditches damaged.	*VII*
Effect on people: Difficult to stand. Shaking noticed by auto drivers. *Other effects:* Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Furniture broken. Hanging objects quiver. *Structural effects:* Masonry D* heavily damaged; Masonry C* damaged, partially collapses in some cases; some damage to Masonry B*; none to Masonry A*. Stucco and some masonry walls fall. Chimneys, factory stacks, monuments, towers, elevated tanks twist or fall. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off.	*VIII*
Effect on people: General fright. People thrown to ground. *Other effects:* Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes. Steering of autos affected. Branches broken from trees. *Structural effects:* Masonry D* destroyed; Masonry C* heavily damaged, sometimes with complete collapse; Masonry B* is seriously damaged. General damage to foundations. Frame structures, if not bolted, shifted off foundations. Frames racked. Reservoirs seriously damaged. Underground pipes broken.	*IX*
Effect on people: General Panic. *Other effects:* Conspicuous cracks in ground. In areas of soft ground, sand is ejected through holes and piles up into a small crater, and, in muddy areas, water fountains are formed. *Structural effects:* Most masonry and frame structures destroyed along with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes and embankments. Railroads bent slightly.	*X*
Effect on people: General panic. *Other effects:* Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. *Structural effects:* General destruction of buildings. Underground pipelines completely out of service. Railroads bent greatly.	*XI*
Effect on people: General panic. *Other effects:* Same as for Intensity X. *Structural effects:* Damage nearly total, the ultimate catastrophe. *Other effects:* Large rock masses displaced. Lines of sight and level distorted. Objects thrown into air.	*XII*

*Masonry A: Good workmanship and mortar, reinforced, designed to resist lateral forces.
Masonry B: Good workmanship and mortar, reinforced.
Masonry C: Good workmanship and mortar, unreinforced.
Masonry D: Poor workmanship and mortar and weak materials, like adobe.

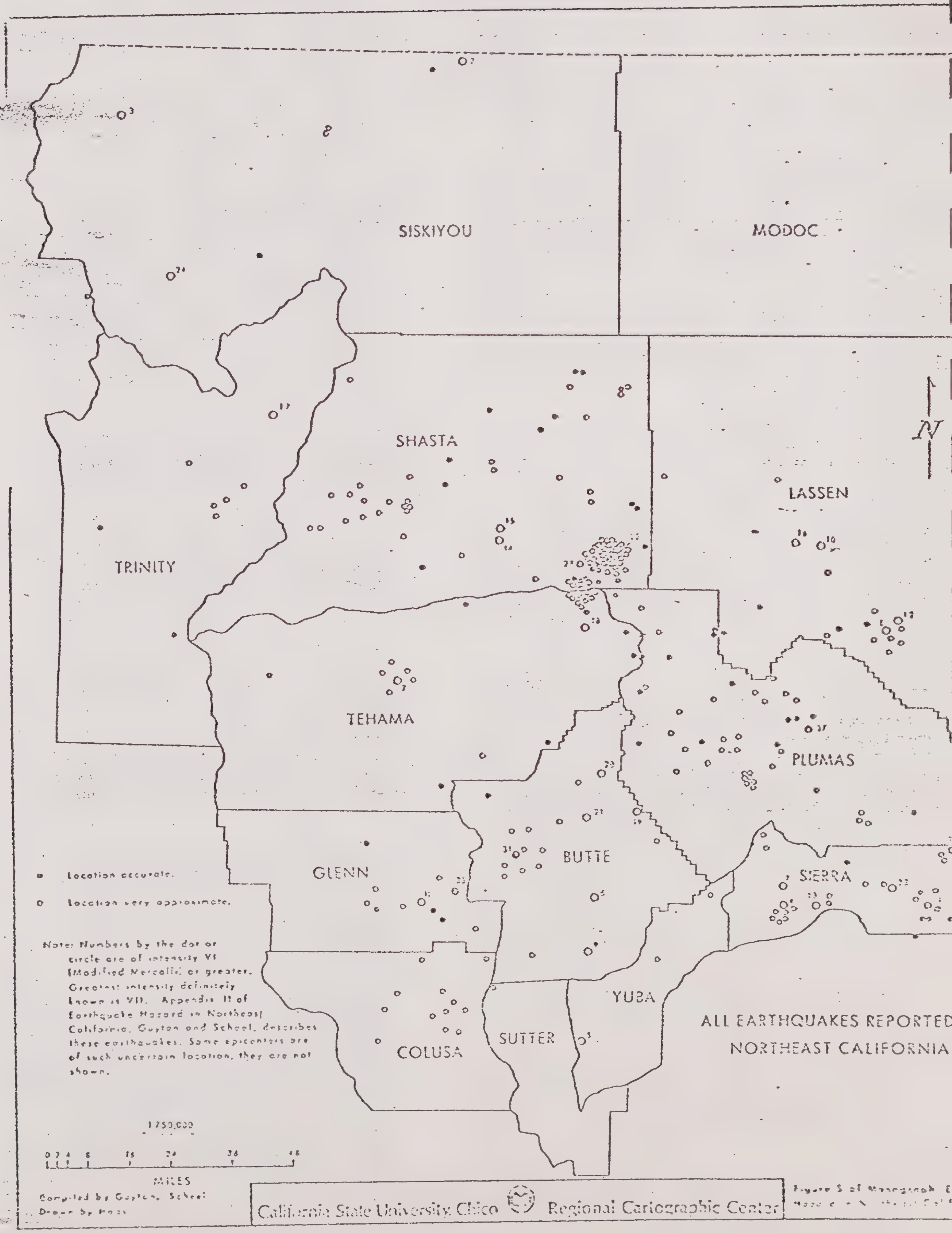
SISKIYOU
MODOC
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
GLENN
BUTTE
SIERRA
COLUSA
SUTTER
YUBA
ALL EARTHQUAKES REPORTED
NORTHEAST CALIFORNIA
N
Location accurate.
Location very approximate.
Note: Numbers by the dot or circle are of intensity VI (Modified Mercalli) or greater. Greatest intensity definitely known is VII. Appendix II of Earthquake Hazard in Northeast California, Guyton and Scheel, describes these earthquakes. Some epicenters are of such uncertain location, they are not shown.
1:750,000
0 2 4 8 15 24 36 48
MILES
Compiled by Guyton, Scheel
Drawn by Haas
California State University, Chico Regional Cartographic Center

Figure SS-2

FAULT DISPLACEMENT

Geologic maps, prepared by the California Division of Mines and Geology, show the pattern of fault traces throughout Modoc County. These faults are mapped as having been active during the quarternary period of geologic time. The quarternary period includes the last two million years.

The California Division of Mines and Geology Bulletin No. 198 contains the following discussion of fault displacement:

"A fault is a fracture in the crust of the earth along which the sides have moved or been displaced, relative to each other, in a direction parallel to the fracture. Active faults are the main sources of earthquakes. Land use planners should consider the possible future effects of fault movement in conjunction with the placement and design of new structures. Two aspects of fault displacement should be considered:

1. The effects that sudden displacement along faults may have on structures built across their traces.
2. The relatively slow effects of fault creep - the gradual ground distortion and movement along a fault trace not accompanied by significant earthquakes.

"Fault displacements involve forces so great that the only means of limiting damage to man-made structures is to avoid areas along traces of active faulting or to design structures to accommodate the expected displacement. In order to avoid faults they must be recognized. All active and potentially active faults have not been located and mapped. This normally is done through geologic mapping and subsurface investigation. Although there are thousands of faults - both large and small - in California, most of these are no longer active and are not likely to be subject to further displacement. Regional studies of fault activity are conducted principally by geologists of the California Division of Mines and Geology, the U.S. Geological Survey and universities; detailed site investigations are conducted by consulting

geologists. Figure SS-3 shows the distribution of faults in California which have had historic and quarternary displacement.

"The present state of the art is such that active faults can be identified and located through detailed geologic mapping, seismic study, trenching, drilling, and geophysical work. Although this work may be expensive, it is possible to locate most active faults accurately and thereafter guide development so that losses due to fault displacement on known active faults can be virtually eliminated.

"Very little can be done to provide protection for structures presently in place across active faults, short of moving the structures. Reduction of future losses can be accomplished best by careful selection of sites for construction. Careful investigation and selection of sites will result in re-siting, prior to construction, of an estimated 85 percent of the structures that otherwise would be built across active faults. When the cost of site evaluation is compared to the value of future structure saved by re-siting, a benefit to cost ratio of about 9.7:1 results."

Bulletin No. 198 makes the following recommendations for reducing the potential for damage that may result from fault displacement:

"The identification and delineation of known and potentially active faults, as called for under the Alquist-Priolo Geologic Hazards Zones Act (Chapter 7.5, Division 2 of the California Public Resources Code), should continue to be carried out rapidly by the California Division of Mines and Geology.

"Geologic site investigations should be required prior to consideration of approv for development in all seismically active areas, and construction setback requirements should be required by local governments along all identified active and potentially active faults.

"Cities and counties should inventory existing structures across active faults. These structures should be removed or downgraded in level of use of occupancy, in

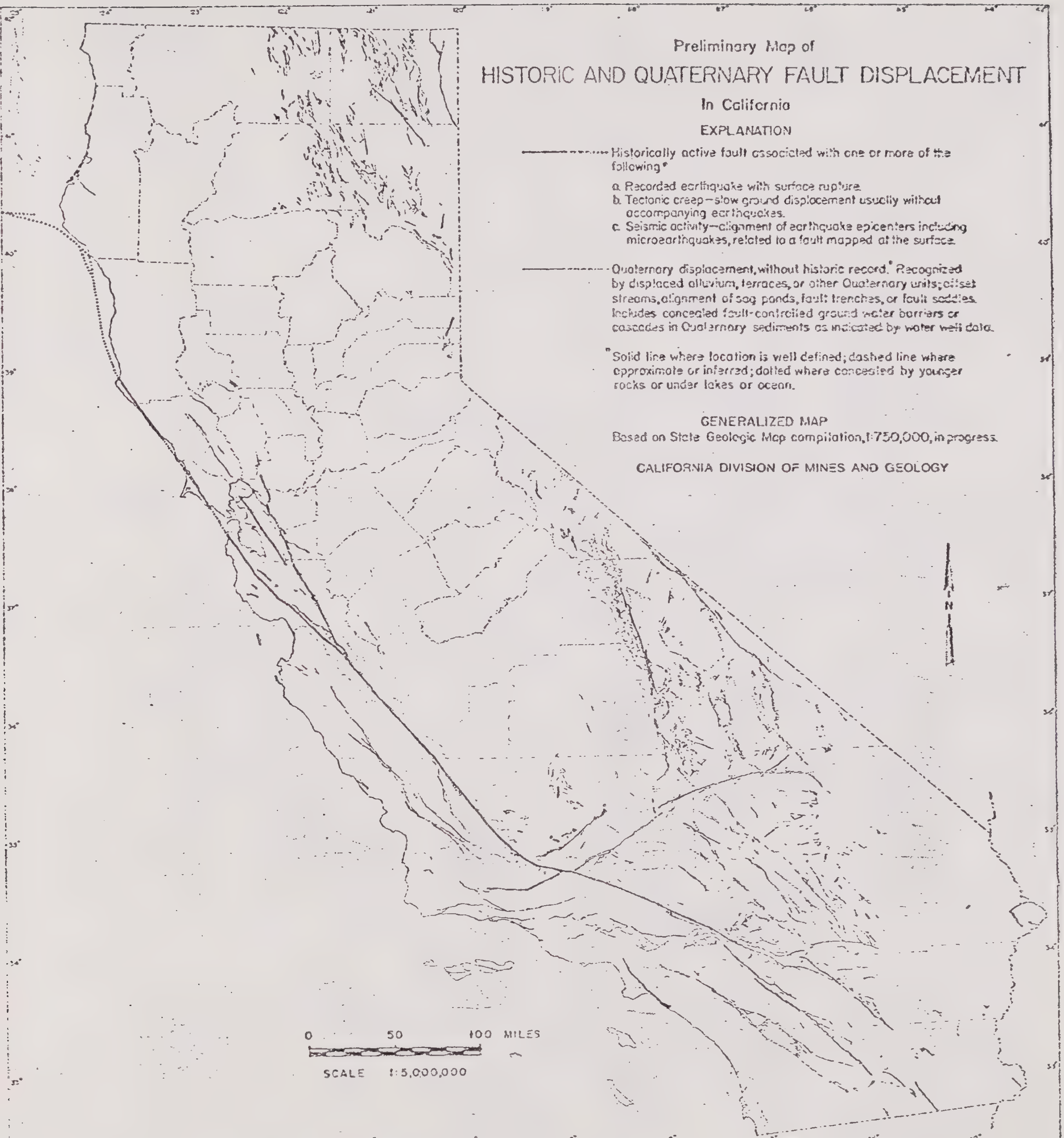

Figure 9. Preliminary map of historic and Quaternary fault displacement in California.

Figure SS-3

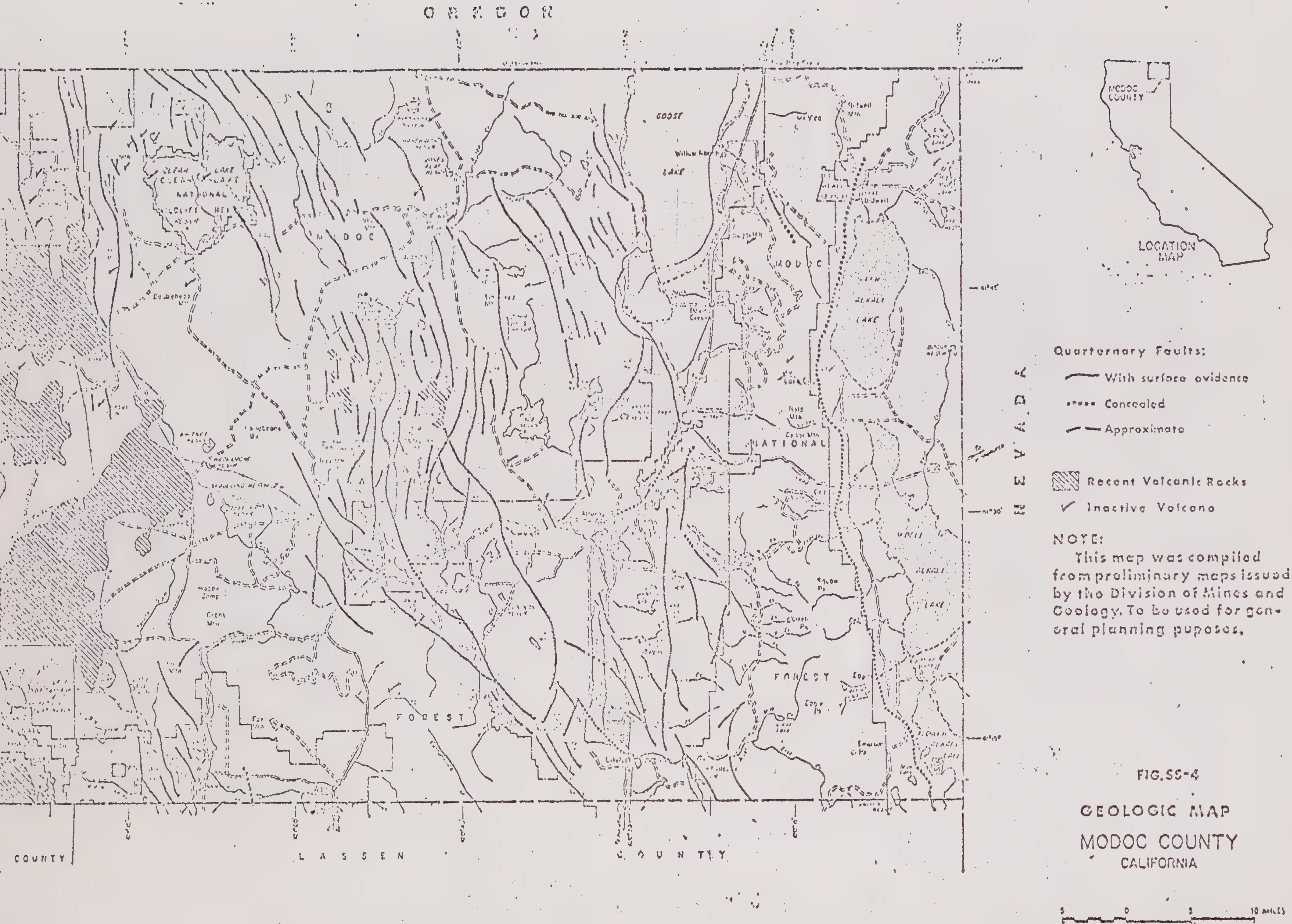

FIG. SS-4

GEOLOGIC MAP
MODOC COUNTY
CALIFORNIA

accordance with some reasonable timetable.

"Consideration should be given to legislation that will require lending institutions to require fault displacement insurance on residential properties as a condition to the granting of a loan on such properties. The fault displacement insurance could be included within a broad-coverage natural disaster insurance program. Insurance organizations should assure themselves that proposed structures are relatively free from potential fault displacement damage before insuring properties against such damages."

POTENTIAL EFFECT IN MODOC COUNTY

The geologic map of Modoc County (figure SS-4) identifies a large number of faults showing evidence of movement within recent geologic time (the past two million years).

The only fault in Modoc County known to have moved within historical time is a fault north of Fort Bidwell. This movement occurred in conjunction with a 1968 Oregon earthquake. It has been described as being a fissure at least 550 feet long with vertical offset as much as 18 inches. The location of this fault has not been mapped on any of the currently available geologic maps.

The C.S.U. monograph indicates that the Surprise Valley fault is probably the only one in the county that would warrant additional study.

Because of Modoc County's sparse population and relatively low potential for extensive development, the possibility of major property damage or loss of life resulting from fault displacement is extremely remote.

VOLCANIC ERUPTIONS

The following discussion of volcanic hazards was extracted from Division of Mines and Geology Bulletin No. 198:

"The effects of volcanic eruptions rank with the most devastating natural disasters known to man. An area that has been overwhelmed by the products of an eruption may be totally destroyed, the lives of all who have not escaped lost, buildings destroyed or rendered unusable, water supply systems destroyed or polluted; and, depending on the type of eruption, farmlands converted to sterile, rocky landscapes which may not be productive for decades or even hundreds of years to come.

"Volcanic eruptions cannot be controlled, although there have been successful attempts to divert lava flows. Obviously the effects of eruptions should be avoided and this is best achieved through advance warnings of an eruption by means of geophysical monitoring. The two methods that have been most successful are:

1. Seismographs, which can detect earth tremors resulting from the subsurface movement of molten magma into conduits. Major eruptions are commonly preceded by strong, local earthquakes.
2. Tiltmeters, which can detect minute differences in earth inclination. Instrument readings on the Hawaiian volcanos indicate that volcano slopes swell outward before an eruption and collapse inward following an eruption.

"It is not possible to estimate future statewide losses accurately. The sparsity of events in historic time hinders the making of statistical estimates of future events; 30-year losses could range from zero to many millions of dollars, depending upon factors of occurrence, kind, severity, location and time.

"The use of lands in the vicinity of volcanos has greatly increased since the last eruption in 1917 and it is reasonable to assume that the low losses in the past will not be the rule in the future. Property losses would accompany an eruption at any time and if an unexpected eruption occurred during a summer tourist season, loss of

life could be high.

"In potentially hazardous areas that have not yet been urbanized, zoning or otl land use controls can be effective in reducing future losses."

Bulletin No. 198 makes the following recommendations for the reduction of poten damage from eruptions:

"The known recent volcanic centers in California should be instrumented or othe wise monitored to assure adequate warning prior to a volcanic eruption. This progra should be conducted by the federal government, either through the U.S. Geological Su vey or the National Oceanic and Atmospheric Administration; major potential volcanic threats are on federal lands.

"Cities and counties in the areas of recent volcanism should evaluate the poten for damage to their jurisdictions and zone or regulate the development in these area in accordance with the relative risks involved."

POTENTIAL EFFECT IN MODOC COUNTY

Nearly all parts of Modoc County have been effected by volcanic action one or more times in the geologic past. The most recent activity took place in the Medicin Lake Highlands within the past 2,000,000 years and some experts believe that this is the most likely location for future volcanism. Figure SS-4 shows the approximate extent of the most recent volcanic rocks. This area embraces the most sparsely populated portion of the county and the existing potential for loss of life and property is almost nil.

LANDSLIDING

Division of Mines and Geology Bulletin No. 198 contains the following discussion of landsliding:

"A landslide is the downhill movement of masses of earth material under the force of gravity. Movement may be rapid or so slow that a change of position can be noted only over a period of weeks or years. The areal size of a landslide can range from several square feet to several square miles. Slide thicknesses may range from less than a foot to several hundred feet. Landslides are a common problem in the hillside areas of California and, in terms of dollar losses, are one of the more costly geologic hazards. Figure SS-5 shows the relative amounts of landslides throughout California.

"Damage due to landslides can be reduced in areas undergoing development by such alternatives as avoidance, removal, or permanent stabilization of slide masses. In all cases, a first critical step is to recognize the existence of an old slide or the probability of a future slide. This is accomplished through detailed geologic mapping, trenching, drilling, and frequently the photo-interpretation of surface geologic conditions. Old slides can be recognized by their lobe-like forms and the track-like hollows which they leave behind them. Probably future slides can often be anticipated in areas where other landsliding has already taken place. Slopes covered with deep soils or hillsides heavily saturated with ground water are potential slide areas. Where bedding or jointing of rock materials and hill slope directions tend to be the same, slide possibilities are greatly increased. Fault zones regardless of recency of movement are also generally potential landslide areas."

Bulletin No. 198 makes the several recommendations for reducing the potential damages from landsliding.

"Geologic mapping, at scales ranging from 1:12,000 to 1:48,000, should be carried out in all areas subject to urban development, on a priority basis, to identify landslides and landslide-prone areas. Cities and counties should be responsible to see

that this is done within their jurisdictions prior to approval of general development patterns. The geologic mapping can be done by private consultants, by local government staff, or in cooperation with the California Division of Mines and Geology.

"Detailed engineering geology site studies should be required for proposed developments within landslide and landslide-prone areas, prior to designing each development. These studies should be carried out by private consultants hired by the developer.

"Proposed developments within landslide and landslide-prone areas should be engineered to avoid or correct all slope stability problems found by the detailed engineering geology studies.

"Geologic and engineering reports should be reviewed for adequacy by qualified professionals, and qualified local government grading inspectors should inspect various stages of the development to insure that all work necessary to prevent future landslide problems is being done.

"Local government should enforce adequate grading ordinances (Chapter 70, Uniform Building Code) by on-site inspection of developments in landslide and landslide-prone areas by qualified grading inspectors. Certification should be required by design civil engineers, soils engineers, and engineering geologists."

POTENTIAL EFFECT IN MODOC COUNTY

Landslides cause very little damage in Modoc County, other than occassionally blocking roads in mountainous areas. These slides have occurred on steep slopes where unstable soils received an excessive amount of water, usually from high intensity storms or above normal winter precipitation. The combination of steep slopes and unstable soils only occurs in isolated areas that are too small to show on generalized maps.

Modoc County requires an environmental assessment of all projects for which it has approval authority. Projects involving steep slopes may require an environmental impact report which could include geologic and soils investigations if it is determined necessary.

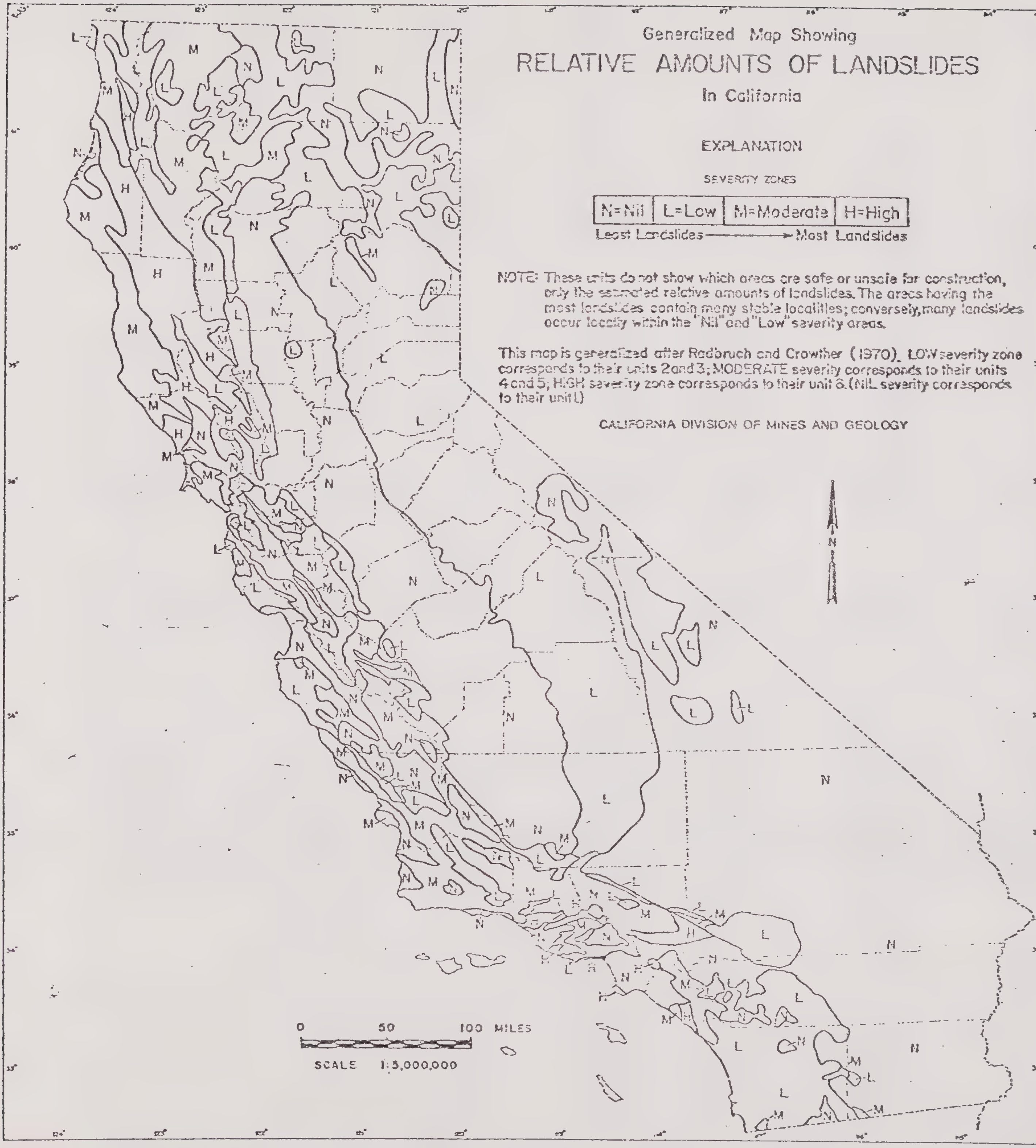

Figure 5. Generalized map showing relative amounts of landslides in California.

Figure SS-5

THE NOISE ELEMENT

OF THE

MODOC COUNTY

GENERAL PLAN

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FOR
NOISE ELEMENT

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APPENDIX TO NOISE ELEMENT

Characteristics of Sound — 1

The Noise Problem in Modoc County — 6

POLICY REGARDING
NOISE
IN
MODOC COUNTY

It shall be the policy of Modoc County to not adopt any new restrictions or regulations relating to Noise at this time.

Existing policies and procedures are adequate to protect the public health, safety and welfare from any presently recognized, potentially damaging noise ~~re~~-sources.

NOISE ELEMENT

One dictionary definition of noise is: "A sound that lacks agreeable musical quality or is noticeably unpleasant." A complete physical description of a sound must include its magnitude, its frequency spectrum (or tone) and the variation of both of these qualities. These qualities determine whether or not a sound is "noticeably unpleasant".

Noise becomes of concern when it causes physical damage to human beings or otherwise effects the public health, safety and welfare. Interference with sleep, conversation and thought may lead to actual physical or mental harm or may simply be annoying. Exposure to high levels of sound may cause hearing loss, particularly when the exposure continues over an extended period of time.

The reaction to or results of exposure to a certain sound level varies by location, by time of day or night, and by the activity being carried out. For example, a noise that is loud enough to awaken a sound sleeper in a rural home at midnight might go unnoticed by a pedestrian in a downtown business district during the five o'clock traffic rush.

The effect of noise has been studied in depth by several agencies of both the federal and state governments. Standards have been developed for occupational noise, noise in relation to federally funded housing projects, noise emitted by motor vehicles, etc. Certain standards are enforced by OSHA, HUD, EPA, State Highway Patrol and other organizations, while some standards are merely suggestions.

CHARACTERISTICS OF SOUND

Sound is a pressure fluctuation in the air, similar to the waves created when a pebble is dropped into a pool of water. Each different sound creates a different pattern of waves in the air just as different size pebbles will create different patterns of waves in the pool. These waves can be measured as to their magnitude and

frequency. Magnitude is the distance the tops (or bottoms) of the waves extend above or below the reference pressure level or above or below the surface of the pool. Frequency is the number of wave crests passing a given point within a specified period of time.

The range of magnitude between the faintest audible sound and the loudest sound the ear can withstand has a ratio of about 1 to 1,000,000. A system of expressing this wide range directly in pressure units would be very awkward because of the large numbers involved. Therefore, the range of pressure fluctuations is "compressed" by expressing the sound pressure on a logarithmic scale. Sound is described in terms of the sound pressure level (SPL), which is ten times the common logarithm of the ratio of the square of the sound pressure being measured to the square of a reference sound pressure. The resulting number, read from a meter, is called a "decibel". On this scale, a 6 decibel increase indicates two times the sound pressure.

Table N-I, borrowed from the Tulare County Noise Element, compares the various sound pressure levels (dBA) of common noises.

The response of human beings also depends on the frequency of the sound. In general, people are less sensitive to sounds of low frequency, such as 100 hertz (Hz), than to sounds at 1000 Hz; also at high frequencies such as 8000 Hz, sensitivity decreases. The most common approach to compensate for this difference in sensitivity is to apply a weighting to the overall sound spectrum in such a way that sounds at various frequencies are weighted in much the same way as the human ear hears. This is accomplished by building into the decibel measuring meter a special electrical network so that the meter responds to the same range of sound frequency as does the human ear. This is referred to as the A weighted sound level. It comes quite close to matching the human interpretation of loudness. Hertz is the international standard unit of frequency, until recently called cycles per second; it refers to the number of pressure fluctuations per second in the sound wave.

TABLE N-I

SOUND LEVEL AND LOUDNESS OF TYPICAL NOISES IN INDOOR AND OUTDOOR ENVIRONMENTS**

db(A) Ref.: 0.0002 H bar	SUBJECTIVE IMPRESSION	COMMUNITY* (Outdoor)	HOME OR INDUSTRY* (Indoor)	RELATIVE LOUDNESS (Human Judgment of Different Sound Levels)
130		Military Jet Aircraft Take-Off With After-Burner From Aircraft Carrier @ 50 Ft. (130)	Oxygen Torch (121)	32 Times As Loud
120	Uncomfortably Loud	Turbo-Fan Aircraft @ Take-Off Power @ 200 Ft. (118)	Riveting Machine (110) Rock-N-Roll Band (108-114)	16 Times As Loud
110		Jet Flyover @ 1000 Ft. (103) Boeing 707, DC-8 @ 6080 Ft. Before Landing (106) Bell J-2A Helicopter @ 100 Ft. (100)		8 Times As Loud
100	Very Loud	Power Mower (96) Boeing 737, DC-9 @ 6080 Ft. Before Landing (97), Motorcycle @ 25 Ft. (90)	Newspaper Press (97)	4 Times As Loud
90		Car Wash @ 20 Ft. (89) Prop. Plane Flyover @ 1000 Ft. (88), Diesel Truck, 40 MPH @ 50 Ft. (84), Diesel Train, 45 MPH @ 100 Ft. (83)	Food Blender (88) Milling Machine (85) Garbage Disposal (80)	2 Times As Loud
80	Moderately Loud	High Urban Ambient Sound (80), Passenger Car, 65 MPH @ 25 Ft. (77), Freeway @ 50 Ft. from Pavement Edge, 10 AM (76 ±6)	Living Room Music (76) TV-Audio, Vacuum Cleaner (70)	70 db(A)
70		Air Conditioning Unit @ 100 Ft. (60)	Cash Register @ 10 Ft. (65-70), Electric type-writer @ 10 Ft. (64) Dishwasher (Rinse) @ 10 Ft. (60) Conversation (60)	1/2 As Loud
60	Quiet	Large Transformers @ 100 Ft. (50)		1/4 As Loud
50		Bird Calls (44) Lower Limit Urban Ambient Sound (40)		1/8 As Loud
40	Just Audible	[db(A) Scale Interrupted]		
10	Threshold of Hearing			
0				

*Numbers in parenthesis are A-Levels

**Branch, Melville Co. and R. Dale Beland, "Outdoor Noise and the Metropolitan Environment--Case Study of L. A. with Special Reference to Aircraft," Department of City Planning, Los Angeles, California, July 1970

Table N-II

SUMMARY OF NOISE LEVELS IDENTIFIED AS REQUISITE TO PROTECT PUBLIC HEALTH AND WELFARE WITH AN ADEQUATE MARGIN OF SAFETY (From EPA Document 550/9-74-004)

Effect	Level	Area
Hearing Loss	$L_{eq(24)} = 70$ dB	All areas.
Outdoor activity interference and annoyance	$L_{dn} = 55$ dB	Outdoors in residential areas and farms and other outdoor areas where people spend widel varying amounts of time and other places in which quiet is a basis for use.
	$L_{eq(24)} = 55$ dB	Outdoor areas where people spend limited amounts of time, such as school yards, playgrounds, etc.
Indoor activity interference and annoyance	$L_{dn} = 45$ dB	Indoor residential areas.
	$L_{eq(24)} = 45$ dB	Other indoor areas with human activities such as schools, et

Explanation of Table N-II:

1. Detailed discussions of the terms L_{dn}, $L_{eq(8)}$ and $L_{eq(24)}$ appear in the EPA document. Briefly, $L_{eq(8)}$ represents the sound energy averaged over an 8-hour period while $L_{eq(24)}$ energy averages over a 24-hour period. L_{dn} represents the L_{eq} with a 10 dB nighttime weighting.
2. The hearing loss level identified here represents annual averages of the daily level over a period of forty years. (These are energy averages, not to be confused with arithmetic averages).

Another significant characteristic of sound, as it effects human beings, is that it is most often not steady. At a given location, sound usually varies from quiet at one moment to loud the next. This characteristic is important because (1) the health damaging effect of sound may be cumulative and (2) single, extremely loud events may be more annoying than continuous exposure to noise.

EFFECTS OF NOISE

The effects of noise on the human being are thoroughly discussed in the document entitled "Information of Levels of Environmental Noise Requisite to Protect Public Health and Welfare With an Adequate Margin of Safety", published by the U.S. Environmental Protection Agency in March, 1974. The conclusions of this publication are summarized in Table N-II.

REDUCING THE EFFECT OF NOISE

The effect of noise can be reduced by providing a barrier to the passage of the sound. Distance is a barrier. At sea level, with no wind and under standard temperature conditions, a sound measurement 200 feet from the sound source will be six decibels lower than a measurement 100 feet from the same sound source. Every time the distance is doubled, the sound level is reduced by 6 dBA. Other barriers used include insulation, road cuts or fills and specially designed devices designed to absorb or reflect sound.

Planning, zoning and building codes are some of the methods local government can utilize to prevent or reduce noise problems.

THE NOISE PROBLEM IN MODOC COUNTY

Noise problems in Modoc County are limited principally to those areas adjacent to transportation facilities. Traffic over highways, roads and streets is responsible for the larger share of the noise in the county. Other noise sources are railroads, airports and sawmills.

MOTOR VEHICLE NOISE

Estimates based on Cal-Trans and Modoc County Road Department traffic counts and analyzed according to preliminary noise evaluation standards developed by the State Department of Housing and Community Development. Figure N-1 shows noise values in terms of estimated weighted day and night averages (L_{dn}) for road segments with sufficient traffic to exceed L_{dn} 60 dBA at 50 feet from the roadway.

Large scale maps with noise contours are included for the towns of Adin, Canby, Cedarville and Newell.

RAILROAD NOISE

Figure N-5 shows the location of the various railroads in Modoc County. It is estimated that where trains are traveling 45 miles per hour, the L_{dn} 60 dBA contour will be 235 feet from the track and the L_{dn} 65 dB contour will be 100 feet from the track. Where trains travel 60 miles per hour, the L_{dn} 60 dB contour will be approximately 330 feet from the track and the L_{dn} 65 dB contour will be 130 feet from the track.

AIRCRAFT NOISE*

Modoc County operates airports located at Adin, Alturas, Cedarville, Eagleville, Fort Bidwell and Newell. These airports are shown on figure N-5.

Adin has a paved and unlighted strip. Air traffic is light. No noise problem is evident.

Alturas has approximately 15 based aircraft and averages about 18 operations per

day. About one-third of the movements are by light, twin engine aircraft. Approximately 85% of the take-offs and landings occur between 7:00 A.M. and 7:00 P.M. Runway 21 (away from town) is used for more than 90% of the take-offs; Runway 03 (toward town) is used for about two-thirds of the landings. The noise produced from this airport is not significant at this time, but a substantial increase in traffic may cause a problem.

Cedarville has approximately ten based aircraft and handles from ten to fifteen operations per day. About one-third of the movements are by student pilots, utilizing low powered single engine aircraft. More than 90% of the take-offs and landings occur between 7:00 A.M. and 7:00 P.M. Runway 01 (away from town) is used for about two-thirds of the take-offs and Runway 19 (toward town) is used for about two-thirds of the landings. The noise produced at this airport does not affect a significant populated area at this time, but a substantial increase in traffic may cause a problem.

Eagleville has a paved and unlighted strip that is remote from any populated area. Air traffic is light and creates no problem.

Fort Bidwell has a gravelled, unlighted strip that is lightly used. No noise problem is evident.

Newell has approximately seventeen based aircraft. More than one-half of the operations are by an aerial applicator who averages fifteen take-offs and landings during the five month spring-summer-fall spray season. These movements are mostly during the early morning before the air warms up excessively. The location of the single, paved strip is such that landing or departing traffic need not pass directly over the town of Newell or over any farm residence within a mile of the airport. The noise produced at this airport should not be significant if aircraft are operated in such a manner as to avoid passing over the populated area. This may require establishment of a right-hand pattern for aircraft landing on Runway 29.

A problem associated with aircraft is that of sonic booms principally from military aircraft engaged in training activities.

*Data for this section obtained from interviews with the airport managers.

Modoc County has adopted a policy requiring certain distances to be maintained between geothermal activities and other uses. Environmental Assessments, considering noise and other factors, are made for all projects for which the County has approval authority.

HIGHWAY
NOISE
MAP

-5-

LEGEND

[55] Distance to Ldn 60dBA Contour

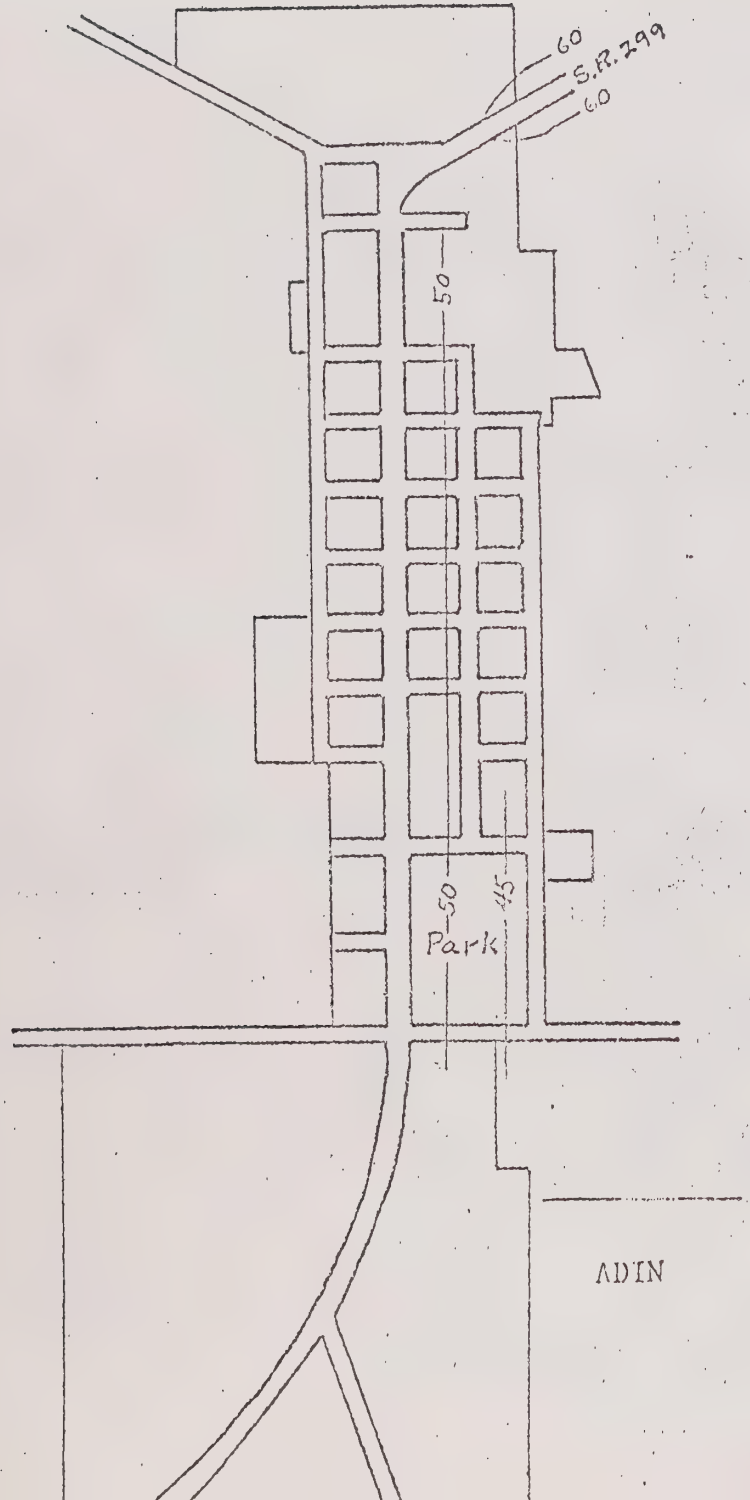
Highway with Ldn 60 dBA Contour at least 50 feet from roadway

Point of starting or ending of noise contour

NOTE: Noise contours estimated from traffic count data. For general planning purposes only.

Figure N-1

NODOC COUNTY
CALIFORNIA
1975



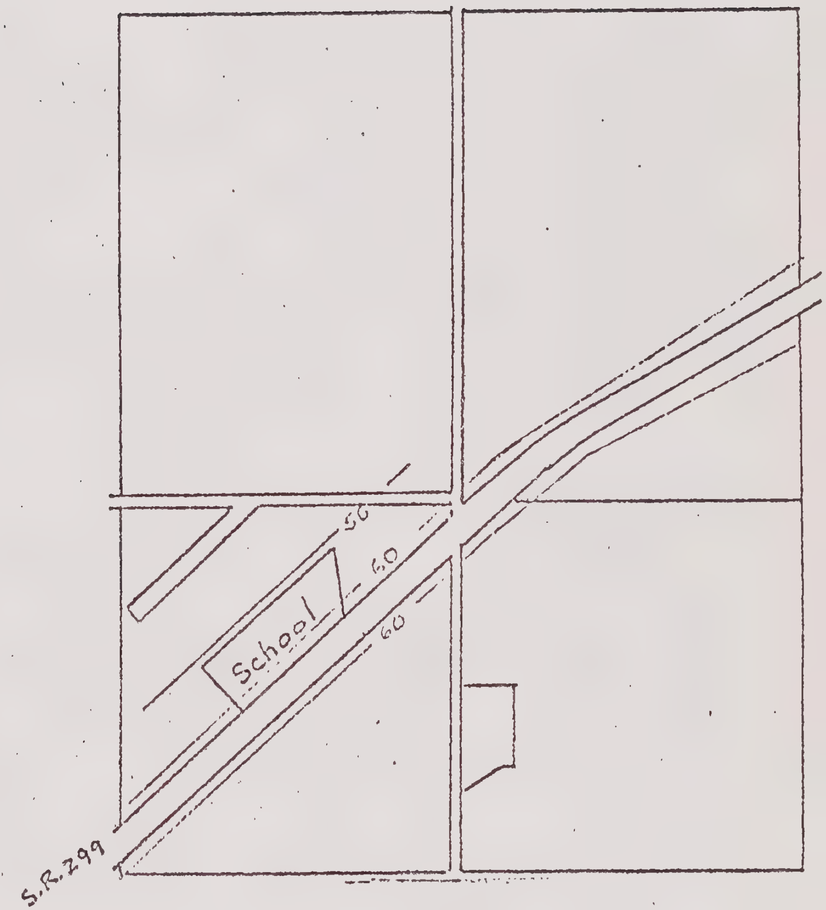


Figure N-2

NOISE CONTOUR
MAP

—60— Noise Contour

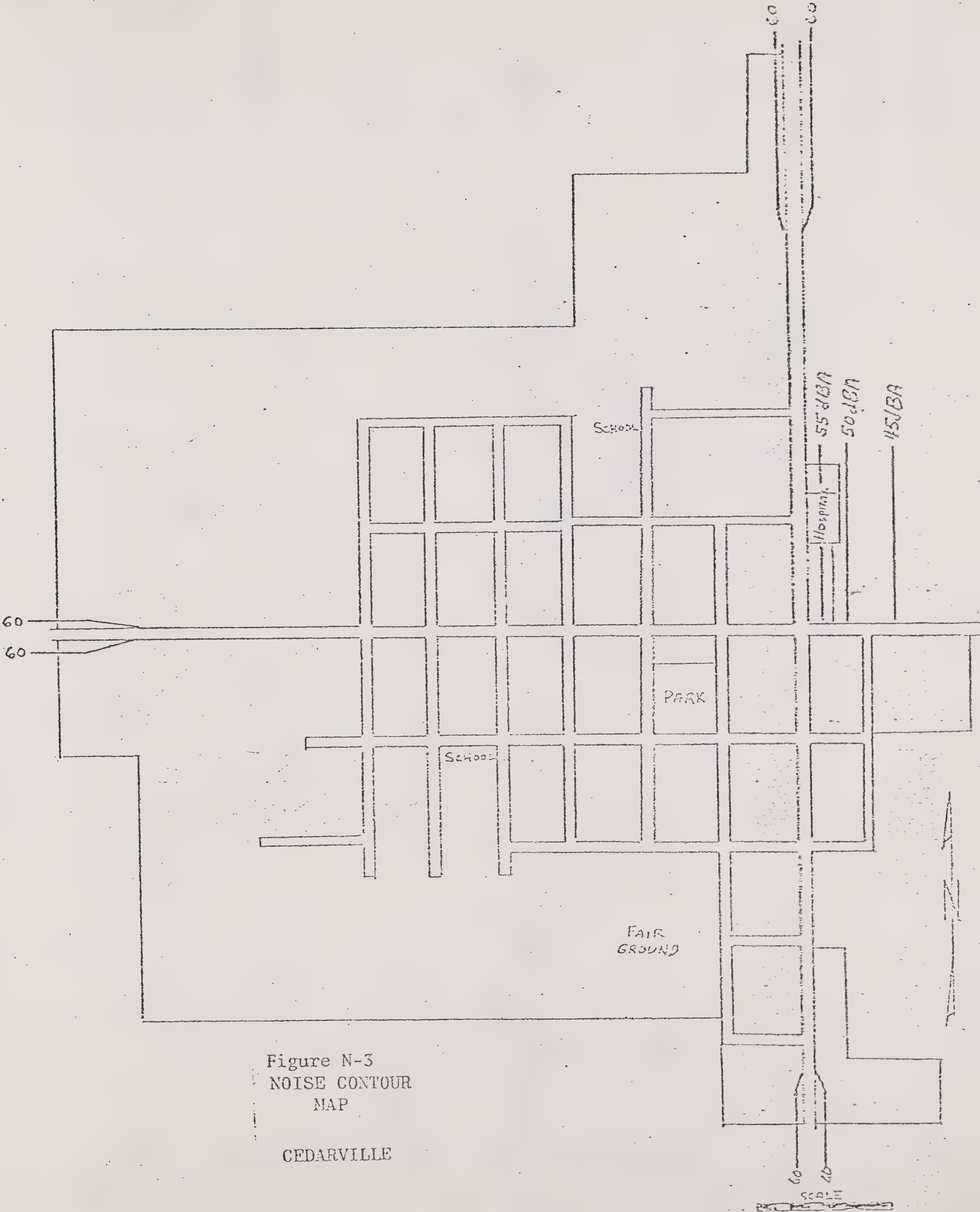


Figure N-3
NOISE CONTOUR
MAP

CEDARVILLE

—50— Noise Contour L_{dn}

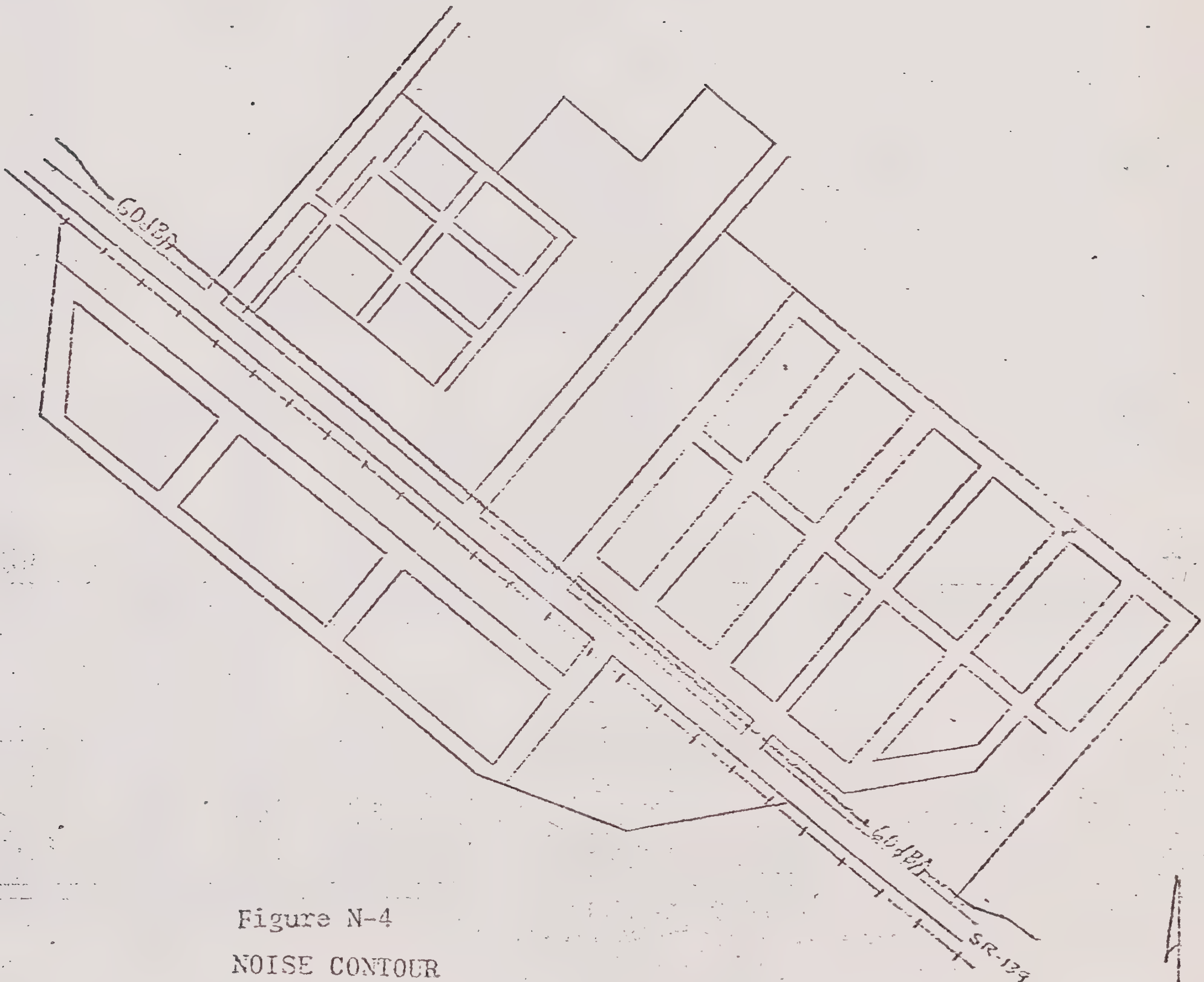


Figure N-4

NOISE CONTOUR
MAP

NEWELL

—— 60 —— Noise Contour L_{dn}

Scale
1 2 3 4 800

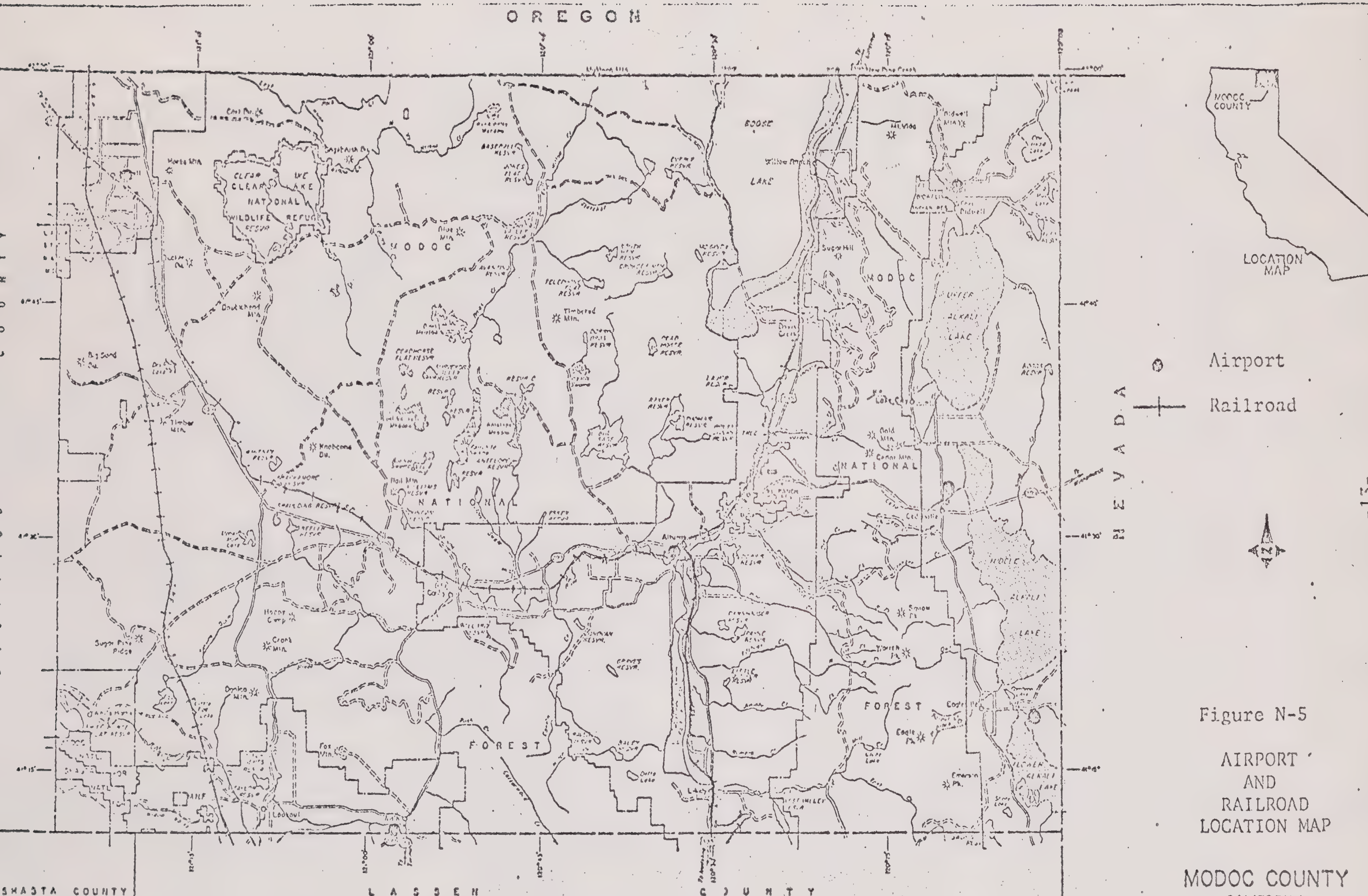


Figure N-5

AIRPORT AND RAILROAD LOCATION MAP

MODOC COUNTY
CALIFORNIA

MAY 1974

THE SCENIC HIGHWAYS ELEMENT

OF THE

MODOC COUNTY

GENERAL PLAN

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SCENIC HIGHWAYS ELEMENT

SCENIC CORRIDORS IN MODOC COUNTY

Nearly every road and highway in Modoc County passes through a scenic corridor. The landscape of the county is varied and includes magnificent views of mountains, valleys, forests, farmlands, grasslands, lakes, streams and deserts.

The Modoc County Board of Supervisors recognizes the importance of the scenic values of the county. Our outstanding scenery is more or less taken for granted by the residents of the county, but is probably one of the reasons why many people come here or stay here. Tourism, one of our leading industries, is enhanced by the scenic qualities of our area.

Modoc County is sparsely populated with only slightly more than 8,000 residents. The land ownership pattern is fragmented with only about 30% being in private ownership.

Because of the sparse population and the predominance of federally owned land, little development has taken place to intrude on the scenic beauty of the county. Much of Modoc County, therefore, looks just like it did before white man first came to the area. Man's activities have probably detracted from some views but have enhanced others.

POLICY RELATING TO SCENIC HIGHWAYS

1. <u>It will be the policy of Modoc County to not designate any particular road or highway segment as a scenic highway.</u>

2. <u>It will be the policy of Modoc County to encourage the preservation of scenic beauty along all of our highways and roads, but not to the complete exclusion of development.</u>

   Developments involving the use of a resource necessarily take place where the resource is located. Private development utilizing land ordinarily

must take place on land owned by the proponent.

IMPELEMNTATION

The above policy can be implemented by utilizing existing authorities including the zoning ordinance, subdivision ordinance and the environmental review procedures.

ENVIRONMENTAL ASSESSMENT
FOR
PUBLIC SAFETY
NOISE
AND
SCENIC HIGHWAYS
ELEMENTS

OF THE

MODOC COUNTY

GENERAL PLAN

ENVIRONMENTAL ASSESSMENT
FOR THE
SAFETY, SEISMIC SAFETY, NOISE AND SCENIC HIGHWAYS
ELEMENTS TO THE MODOC COUNTY GENERAL PLAN

I. DESCRIPTION OF PROJECT

The project consists of the adoption of four mandatory elements to the Modoc County General Plan. These elements outline proposed policy relating to Safety, Seismic Safety, Noise and Scenic Highways. These proposals are as follows:

1. It should be the policy of Modoc County to not adopt any new restrictions or regulations relating to Safety or Seismic Safety at this time.
2. It shall be the policy of Modoc County to not adopt any new restrictions or regulations relating to Noise at this time.
3. It will be the policy of Modoc County to not designate any particular road or highway segment as a scenic highway.
4. It will be the policy of Modoc County to encourage the preservation of scenic beauty along all of our highways and roads, but not to the complete exclusion of development.

II. DESCRIPTION OF ENVIRONMENTAL SETTING

The physical environment of Modoc County is described in the Resources section of the Natural Resources Elements of the Modoc County General Plan. Further information is contained in the appendix sections of the Safety, Seismic Safety and Noise Elements.

III. ENVIRONMENTAL IMPACT

A. Safety and Seismic Safety Elements:

The proposed policy will have no direct effect upon the physical environment, since no changes are suggested.

There remains a possibility that a fire, a flood or a geologic event could cause human death or injury. This possibility is considered to be very remote, since there has been no historical record of an event of the magnitude that would cause death or injury. New uses for which permits are issued must comply with building codes and must be reviewed to determine potential environmental impact.

B. Noise Element:

The proposed policy will have no direct effect upon the physical environmen since no changes are suggested.

There remains a possibility that existing transportation and industrial noise could cause some annoyance to neighboring residential users. Noise studies have shown that existing noise sources are not of sufficient magnitude to cause any adverse effect. New uses for which permits are issued must be reviewed to determine potential environmental impact.

C. Scenic Highway Element:

1. Not Designate Any Scenic Highway

There may be some reduction in aesthetic values if certain types of development occurs where highways with scenic values pass through privately owned lands. Most development, other than for agricultural or forestry purposes, requires a use permit and is therefore subject to environmental review on a case-by-case basis. 70% of the land in the county is federally administered and any development will require environmental analysis.

2. Encourage the Preservation of Scenic Values, But Allow Controlled Development

See discussion under 1, above.